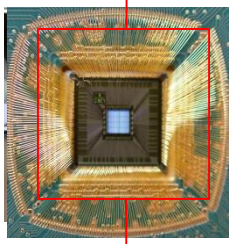
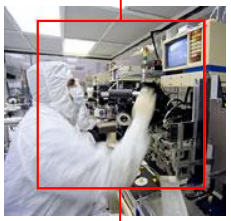
Making EEE Parts Selection Less Risky





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criteria labs

a semiconductor engineering and services company

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Problem Statement

EEE Parts Selection can be Risky Business

System Designer must understand and consider the following:

1. Criticality of Application – Is it a "must work"?
2. Environment/Lifetime – Harsh environment? Length of mission?
3. Affordability

Critical Success Factor

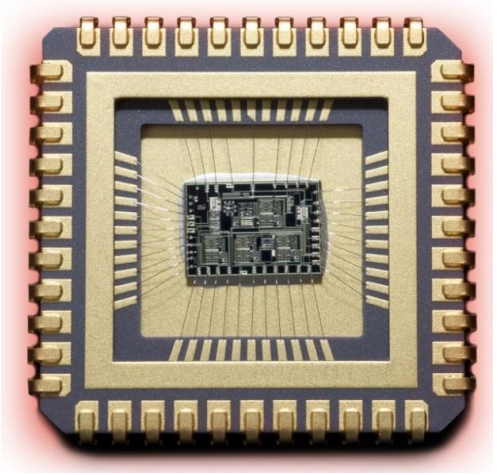
The Availability of Devices that meet Criticality, Environment/ Longevity, and Affordability is what the NASA System Designer needs to have confidence in to make the correct decision.

Availability of Devices that fall into these four categories:

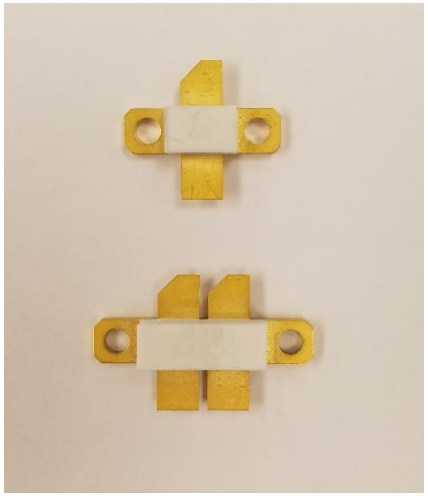
1. COTS
2. Commercial Upscreening
3. NASA Level 1 and 2 Screening
4. Space Qualified QML Class V

This is what Criteria Labs does

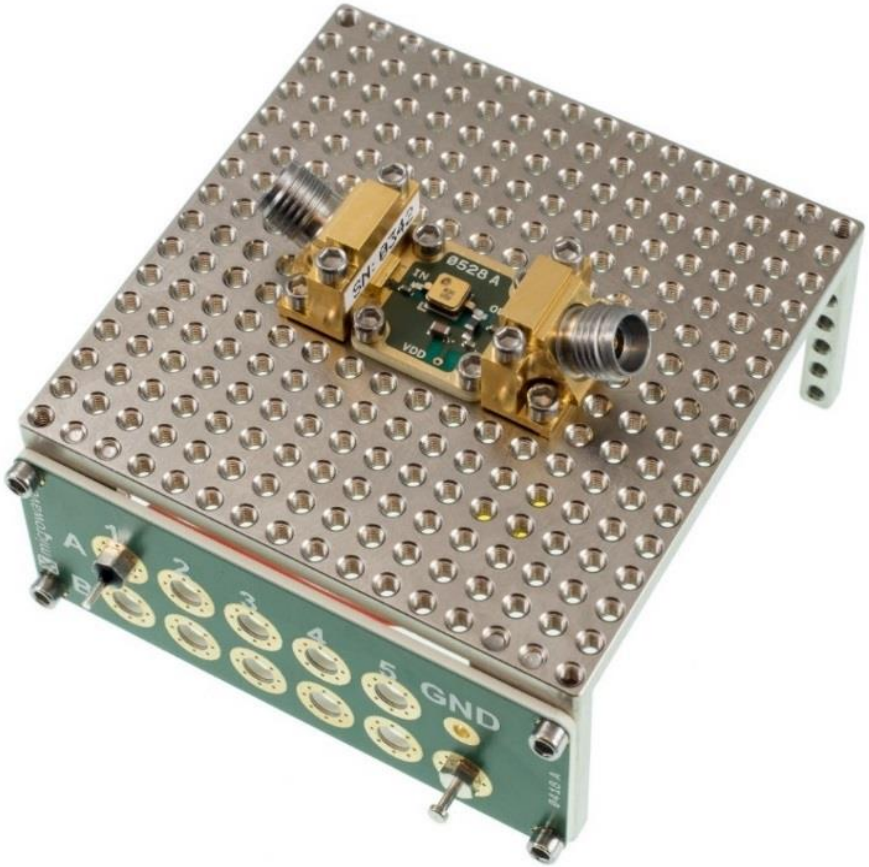
Space Qualified QML Class V devices

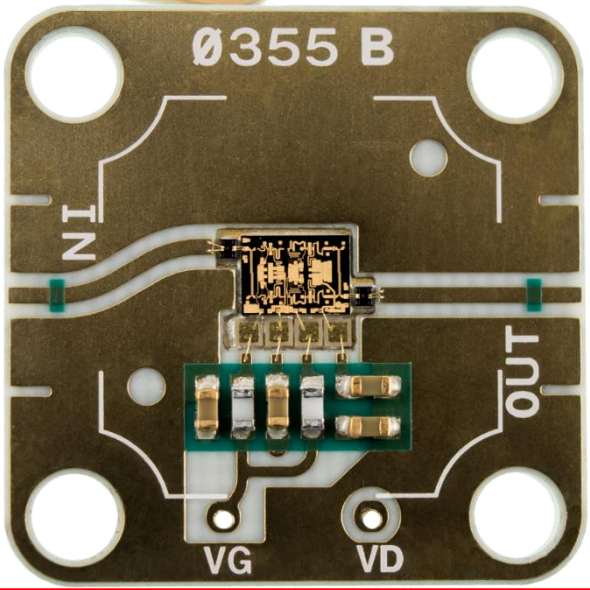


1. Full Turn Key 38535 / 883 QML Assembly and Qualification
2. Package Assembly – Class 100 clean Room
    1. Package die in hermetic packaging
    2. High Reliability multi-chip modules – Hermetic
    3. Custom package design / RF / multichip modules / photonics
        1. Organic
        2. Ceramic
3. Three temp Electrical / Stress Screening
    1. Test Program Development
    2. Electrical test
4. Device Qualification
    1. Group A Electrical
    2. Group B Testing
    3. Group C
        1. Test board design, layout
        2. Burn In Ovens (Dynamic / Static)
    4. Group D (All tests performed in house except RGA)
5. Data pack creation and Flight Units shipped



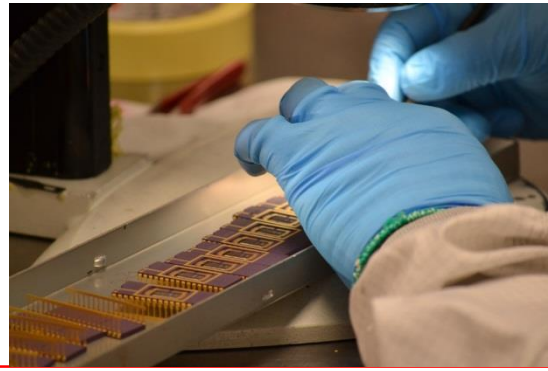
RF Eval Assemblies





Packaging Services

- **Process Engineering Development**
  - Process development, tooling design
  - Package design and Fabrication
- **Prepackaging and Wafer Handling**
  - Wafer Saw, sort and MIL inspection
  - Class 1000 clean room, Class 100 critical areas
- **Packaging Assembly**
  - 38535 /883 MIL Ceramic Assembly
  - MCM, RF Assembly, Open cavity, TO Can
  - Smart Card Assembly and Flex Board Assembly
  - Chip on Board (Includes SMT Attachment)
  - Stack die
  - Flip chip
- **Void Free Process Development and Assembly**
  - Process development
  - Tooling development



Packaging Capabilities

- Wafer Saw 2” to 8”
- Die sort, manual & Automatic, including wafer mapping
- Die inspection, MIL-STD 883, method 2010 A or B Level
- Die attach- JM7000, 84-1/3, Silver Glass, Eutectic, Die Mat, Indium, other
- Plasma Clean- Ar, H, O gas
- Wire Bond- Wedge (Al & Au) Ball (Au)
- Pre cap inspection A or B Level
- Vacuum bake
- Solder Seal, Seam Seal, Resistance seal
- Vacuum solder seal
- PIND test
- X-Ray
- CSAM
- Full environmental screening

Packaging Equipment

DATACON EVO-2200

JUKI KE-2070

SST VACUUM SEALER

DEK SCREEN PRINTER

SIKAMA REFLOW OVEN

Packaging Equipment *(continued)*

F&K
6400

ESEC
3100

ELECTROX
LASER MARKING

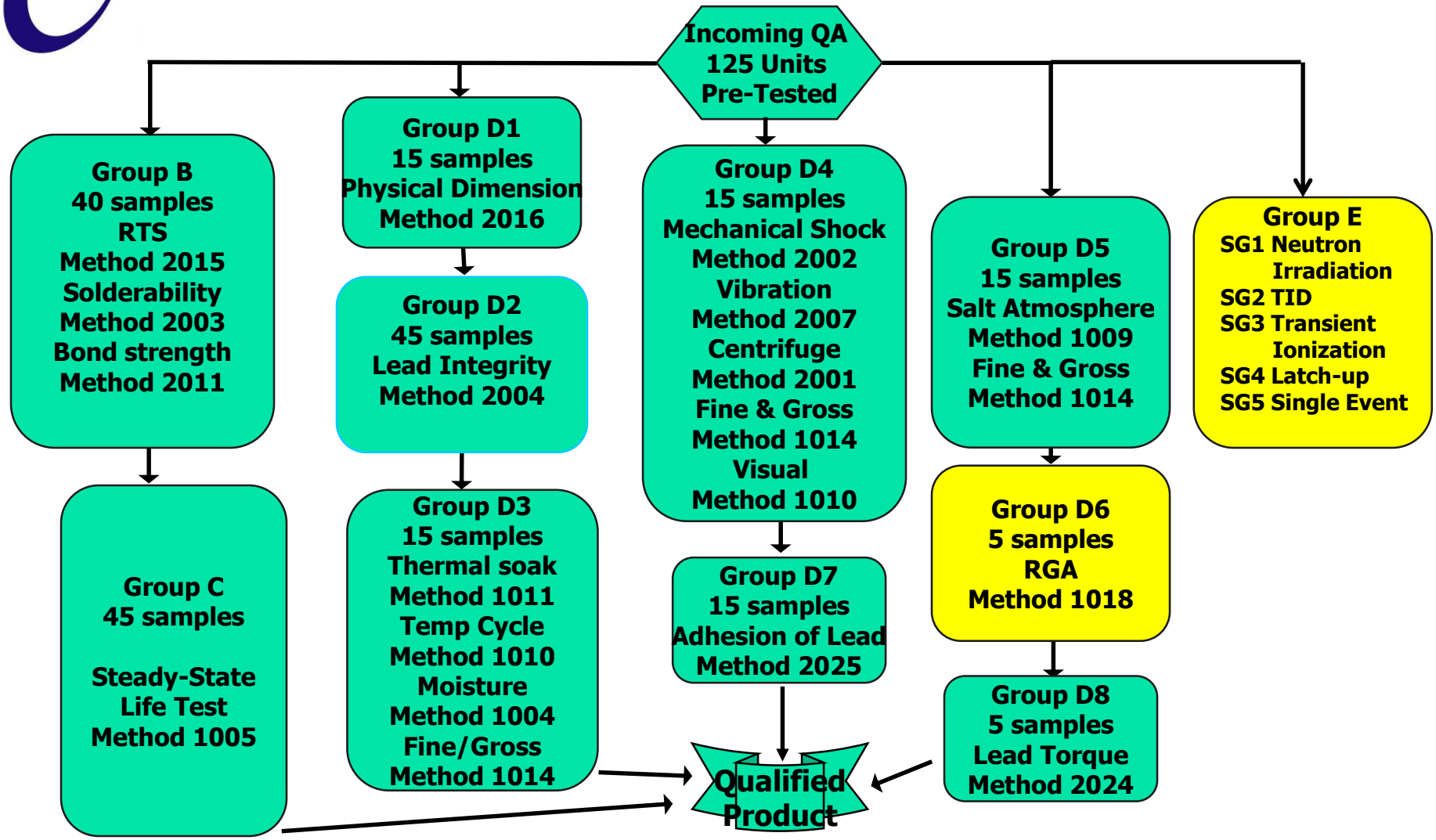
NASA Level 1, 2, and 3 Screening Capabilities

EEE-INST-002

- Full Turnkey Screening and Qual
- (MIL-STD-883,MIL-STD-202,MIL-STD-750)
  - Monolithic Microcircuits
  - Hybrid Microcircuits
  - Resistors and Capacitors
  - Crystals
  - Filters
  - PEMS (plastic encapsulated)
- For Destructive Physical Analysis we partner with Microtech Labs

- John Olson is speaking here at 2:10pm today

883 Groups A, B, C, D & E Testing



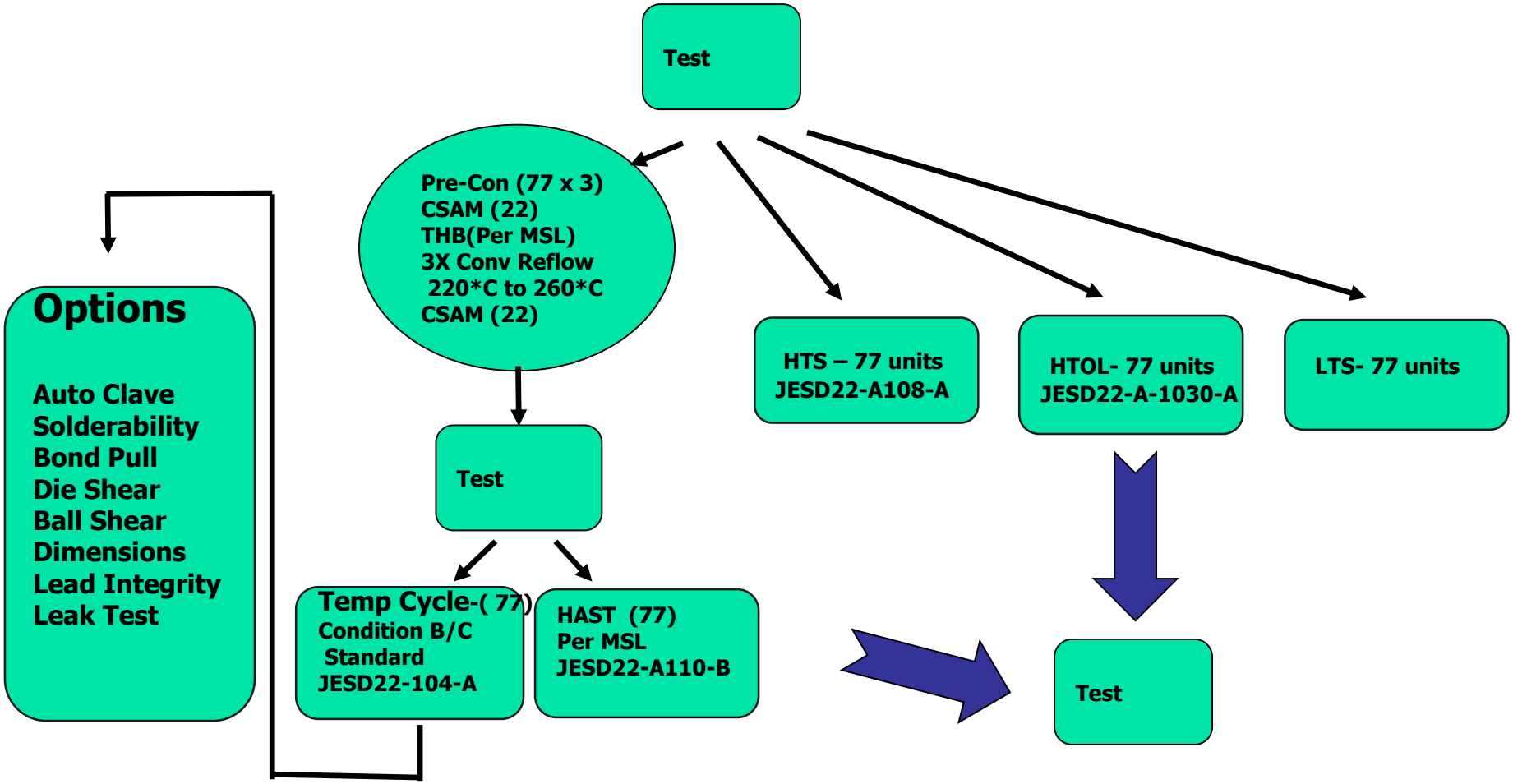
Device Qualification Services

Reliability Equipment

(2) ESPEC TSE-11-A Temp Cycle Chamber -65 to +150°C, paperless recording

- (5) ONE Box Dynamic Burn In (+250 °C)
- (1) Dispatch Temp Humidity Oven
- (3) ESPEC Temp Humidity Chamber (TEMP -20°C to + 85°C) (Humidity 40% to 95% RH)
- (2) Express Test HAST Oven, Model 1000
- Low temp storage chamber
- Test Equity Temp cycle chamber +175°C to -65°C
- Cincinnati Sub Zero Temp cycle chamber +250°C to -70°C
- Scientific American Bake Oven (Up to 250°C)
- Blue M Bake Ovens (Up to 300°C)
- NAPCO 8300 Autoclave Oven
- Advanced Techniques Pro-1600 Reflow Profile Oven
- Dage 4000 Wire Bond Pull / Die Shear
- Resistance to Solvents Station
- Steam Age Station
- Lead Integrity Station
- Associate Environmental-Salt Chamber
- Labworks Shock and Vibration station
- Spectral Dynamics PIND tester

PEMs Upscreening



Test Services

Wafer-level Capability:

Wafer Probe:

- RF
- Analog
- Digital
- Photonics

WLAT – MIL-PRF-38534 Class K & H

- Die Element Eval
- Bond pull and Die shear
- SEM

Automated Wafer Map creation

Saw

Die Pick

Die Inspection (Cond A & B)

Device Test:

Technologies:

- RF Test – 50 GHz
- Analog
- Digital – 200MHz
- Photonics – lasers and PD's

Reliability Levels:

- Class V & Q
- NASA Level 1/2/3

Package Types:

- Hermetics, Hybrids, COTS

Multi-Temp Test (-70C to 250C):

- Post Clabs Assembly
- COTS Screening
- Qualification

More about Criteria Labs

HQ in Austin Texas – 20,000 sq. ft.
2nd Site Penrose Colorado – 15,000 sq. ft

Markets served:

- Space
- Aerospace and Defense
- Commercial Semiconductor
- Downhole Electronics
- Medical

Certifications:

- MIL-PRF-38535 / MIL-STD-883
- DLA Class Q Assembly and Test
- DLA Lab Suitability (Reliability)
- ISO 9001:2008
- Certification Roadmap: AS9100, Class V assembly and test, and AEC-Q100

Tape and Reel Services

- Penrose Colorado
- Largest TnR house in the U.S.A.
- Tape Design and Fabrication
- Custom tooling
- High volume production capability for all surface mount devices (SMT)
- Meet or exceed all JEDEC or EIA standards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